

Review...

Formulas for slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad m = \frac{\text{rise}}{\text{run}} \quad m = \frac{\text{change in } y}{\text{change in } x} \quad m = \frac{\Delta y}{\Delta x}$$

Another name for slope ROC (Rate of change)

Parallel Lines have equal slopes

Perpendicular lines-

The slopes are negative reciprocals of each other

$$\begin{aligned} \text{Ex } m &= -2 \\ \perp m &= \frac{1}{2} \end{aligned}$$

Problems with the homework?

p. 340: #13, 18

p. 349: #5, 7, 9, 10, 13, 16, 17

6.4 Slope-Intercept Form of the Equation for a Linear Function

LESSON FOCUS

Relate the graph of a linear function to its equation in slope-intercept form.

Make Connections

This graph shows a cyclist's journey where the distance is measured from her home.

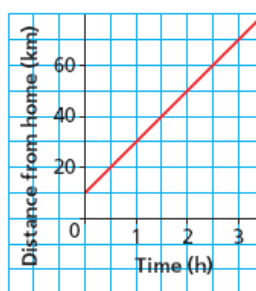
What does the vertical intercept represent?

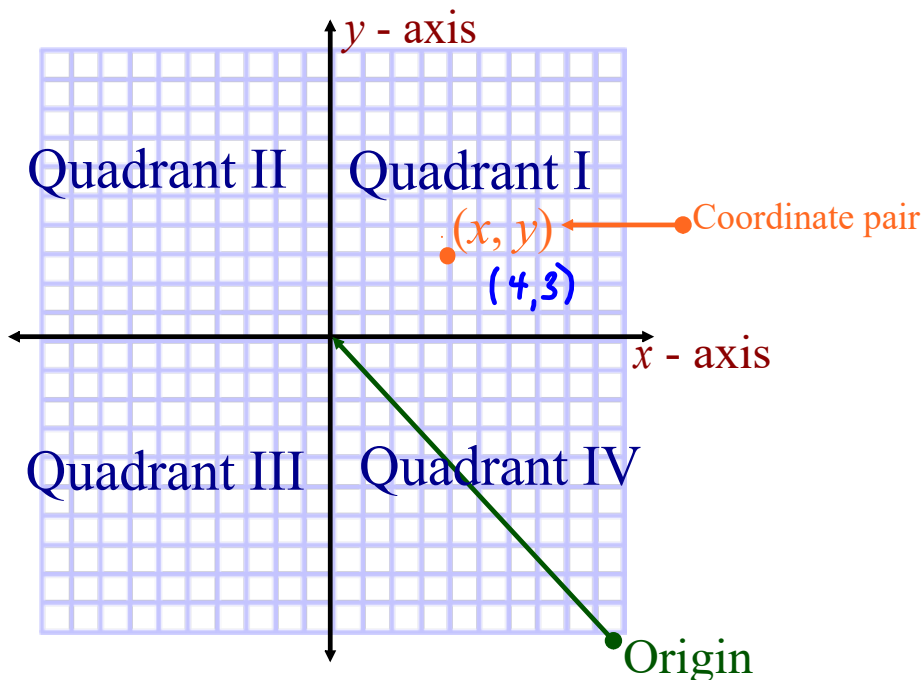
What does the slope of the line represent?

a) starting point 10km from home

b) $\frac{\text{distance}}{\text{time}}$ $\frac{\text{km}}{\text{hr}}$ Speed

Graph of a Bicycle Journey



* Cartesian Plane *Finding Intercepts

x-int

- x - intercept: - a point where the graph crosses the x-axis.
- to find the x-intercept \Rightarrow let $y = 0$ & solve for x.

y-int

- y - intercept: - a point where the graph crosses the y-axis.
- to find the y-intercept \Rightarrow let $x = 0$ & solve for y.

Example: Find both intercepts given the line...

$$3x - 6y = 12$$

x-int, let $y=0$

$$3x - 6(0) = 12$$

$$3x = 12$$

$$x = 4$$

$$(4, 0)$$

y-int, let $x=0$

$$3(0) - 6y = 12$$

$$0 - 6y = 12$$

$$-6y = 12$$

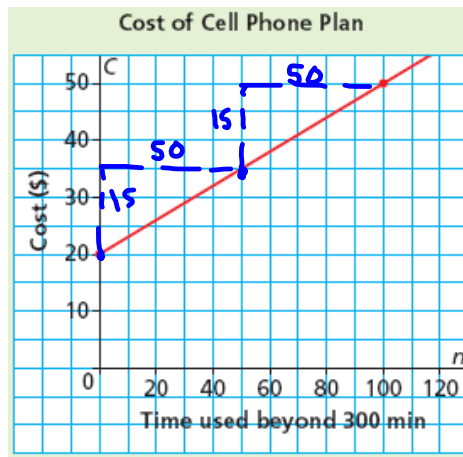
$$\frac{-6y}{-6} = \frac{12}{-6}$$

$$y = -2$$

$$(0, -2)$$

- a) How do you know this is the graph of a linear function?
 b) What does the slope of the graph represent?

- a) same slope
 b) Cost / min beyond 300 min



Write an equation to describe this function. Verify that your equation is correct.

$$y = mx + b$$

↑ slope ← y-int

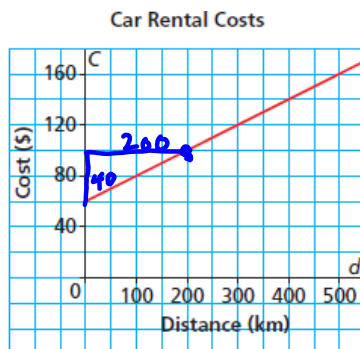
Slope y-int Form

$$m = \frac{15}{50} = \frac{3}{10}$$

$$b = 20$$

$$y = \frac{3}{10}x + 20$$

In Chapter 5, Lesson 5.6, we described a linear function in different ways. The linear function below represents the cost of a car rental.



An equation of the function is:

$$C = 0.20d + 60$$

The number 0.20 is the rate of change, or the slope of the graph. This is the cost in dollars for each additional 1 km driven.

The number 60 is ?

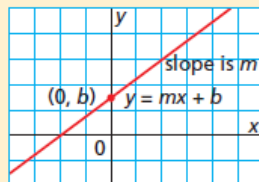
$$m = \frac{40}{200} = 0.20$$

$$b = 60$$

In general, any linear function can be described in slope-intercept form.

Slope-Intercept Form of the Equation of a Linear Function

The equation of a linear function can be written in the form $y = mx + b$ where m is the slope of the line and b is its y -intercept.



6.4 Slope-Intercept Form of the Equation for a Linear Function

Example 1

Writing an Equation of a Linear Function Given Its Slope and y -Intercept

The graph of a linear function has slope $\frac{3}{5}$ and y -intercept -4 .

Write an equation for this function.

$$\begin{aligned}
 & y = mx + b \\
 \checkmark \quad & y = \frac{3}{5}x - 4 \quad \dots \quad 5y = \frac{5}{5} \cdot \frac{3}{5}x - \frac{5}{5} \cdot 4 \\
 & 5y = 3x - 20 \\
 & 3x - 5y - 20 = 0 \\
 & \text{General Form}
 \end{aligned}$$

6.4 Slope-Intercept Form of the Equation for a Linear Function

$$Ax + By + C = 0$$

YOUR TURN...

1. The graph of a linear function has slope $-\frac{7}{3}$ and y -intercept 5. Write an equation for this function.

$$y = mx + b$$

$$y = -\frac{7}{3}x + 5$$

$$3y = -7x + 15$$

$$7x + 3y - 15 = 0$$

Example 3

Writing the Equation of a Linear Function Given Its Graph

Write an equation to describe this function.
Verify the equation.

$$m = \frac{\text{rise}}{\text{run}}$$

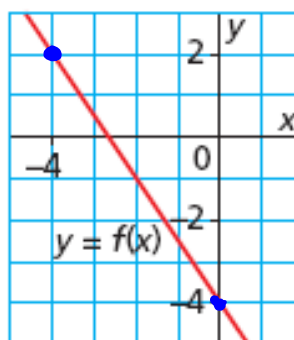
$$= \frac{-6}{4}$$

$$= -\frac{3}{2}$$

$$b = -4$$

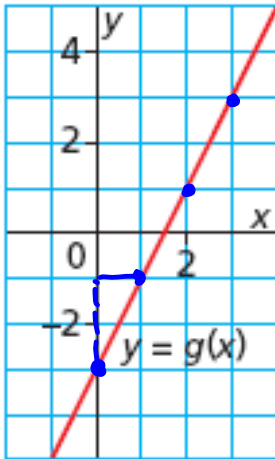
$$y = mx + b$$

$$y = -\frac{3}{2}x - 4$$



YOUR TURN...

3. Write an equation to describe this function. Verify the equation.



$$m = \frac{\text{rise}}{\text{run}}$$

$$= \frac{2}{1}$$

$$= 2$$

$$b = -3$$

$$y = mx + b$$

$$y = 2x - 3$$

ex: Determine the **slope** and **y-intercept** of the following line.

$$y = \underbrace{5}_{\uparrow m}x + \underbrace{7}_{\uparrow b}$$

$$2(3y - 1) = -2(x + 7)$$

$$6y - 2 = -2x - 14$$

$$6y = -2x - 14 + 2$$

$$\frac{6y}{6} = \frac{-2x}{6} - \frac{12}{6}$$

$$y = \underbrace{-\frac{1}{3}}_{\uparrow m}x - \underbrace{2}_{\uparrow b \text{ (y-int)}}$$

EXAMPLE:

Determine the equation of the line that passes through the points (3, -4) & (0, 4)

$$(0, 4) \quad b=4$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-4 - 4}{3 - 0}$$
$$= -\frac{8}{3}$$

$$y = mx + b$$

$$y = -\frac{8}{3}x + 4$$

Practice Problems...

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#4, 5, 8, 11, 12, 18, 19, 20